

Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11) EP 0 656 458 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:  
06.11.1996 Bulletin 1996/45

(51) Int. Cl.<sup>6</sup>: E21B 10/56, B23B 27/14,  
B24B 3/60, B24B 37/00

(43) Date of publication A2:  
07.06.1995 Bulletin 1995/23

(21) Application number: 94870183.4

(22) Date of filing: 22.11.1994

(84) Designated Contracting States:  
BE DE DK FR GB IT NL

(30) Priority: 22.11.1993 US 156086

(71) Applicant: BAKER HUGHES INCORPORATED  
Houston Texas 77027 (US)

(72) Inventors:

- Lund, Jeffrey B.  
Salt Lake City, Utah 84105 (US)
- Smith, Redd H.  
Salt Lake City, Utah 84117 (US)

(74) Representative: Bairiot-Delcoux, Mariette et al  
Office Kirkpatrick S.A.,  
Avenue Wolfers, 32  
1310 La Hulpe (BE)

(54) Superhard cutting element having reduced surface roughness

(57) A superhard cutting element (10) having a polished, low friction substantially planar cutting face (40) with a surface finish roughness of 254 nm (10  $\mu$  in.) or less and preferably 12,7 nm (0,5  $\mu$  in.) or less.

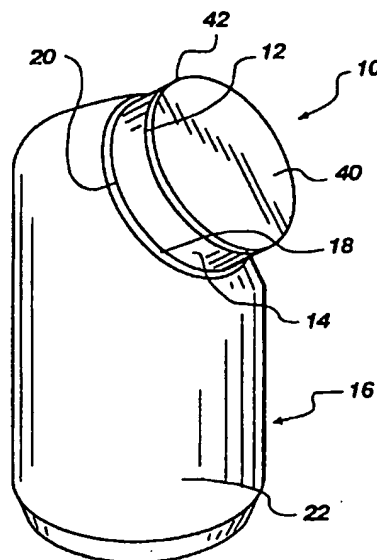


Fig. 1

EP 0 656 458 A3

EP 0 656 458 A3

European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 94 87 0183

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. CL.6)
X	EP-A-0 541 071 (SUMIMOTO ELECTRIC INDUSTRIES LIMITED)  * page 18 * * page 6, line 30 - line 37 * * abstract *	1,2, 4-10, 14-23	E21B10/56 B23B27/14 B24B3/60 B24B37/00
A		11	
A	* page 4, line 1 - line 2 * ---	24-29	
X	EP-A-0 480 394 (SUMIMOTO ELECTRIC INDUSTRIES LIMITED)  * page 12 * * abstract * * column 4, line 42 - line 44 *	1,2, 4-10, 14-23	
A		11	
A	* page 2, line 21 - line 26 * ---	24-29	
X	EP-A-0 298 729 (SUMIMOTO ELECTRIC INDUSTRIES LIMITED)  * abstract * * page 3, line 53 * * page 5; table 1 * * page 3, line 35 - line 44 *	1,2, 4-10, 14-23	TECHNICAL FIELDS SEARCHED (Int. CL.6)  E21B B23B B28D B24B
A		11	
Y	* page 4, line 18 - line 21 * ---	24-29	
Y	US-A-5 184 433 (MAACK) * column 2, line 50 - line 53 * ---	24-29	
A	US-A-4 693 035 (DOYLE) * column 1, line 19 - line 26 * ---	24-29	
A,D	US-A-4 976 324 (TIBBITS)  * column 3, line 40 - line 44; claim 1 * --- -/--	1,11,14, 22	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 September 1996	Examiner Sogno, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 150 (01.92) (P/0401)

EP 0 656 458 A3



European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 94 87 0183

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US-A-4 539 018 (WHANGER) * column 5, line 4 - line 11 * * column 4, line 37 - line 46 * ---	1,11,14,22	
A	EP-A-0 149 530 (CDP, LIMITED) * claim 31 * ---	1,11,14,22	
A	US-A-4 211 508 (DILL) * abstract * * claim 1 * ---	1,11,14,22	
A	US-A-5 011 509 (FRUSHOUR) * claim 2 * ---	1,11,14,22	
A	DE-A-42 40 053 (AGATHON AG MASCHINENFABRIK) * the whole document * ---	24-29	
A	DE-A-41 41 900 (VOLLMER WERKE MASCHINENFABRIK GMBH) * the whole document * ---	24-29	
A	US-A-5 215 415 (FUKUOKA) * column 5, line 61 - line 66 * -----	24-29	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 September 1996	Examiner Sogno, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons Δ : member of the same patent family, corresponding document	

EPO FORM 1503 (01.82) (P04001)